INPUT®

Atrium at Glenpointe, 400 Frank W. Burr Blvd., Teaneck, NJ 07666 (201) 801-0050
Fax (201) 801-0441

FAX TRANSMITTAL FORM

Date: 10/15/92

Confidential: Y / N

Urgent: Y / N

To: Name: Renee

Tel./Location:

Co.:

Page: 1 of 4

Fax No:

File: Chron

Contact

Other: TOF

From: JB

Subject:

I have not sent countersigned authorization.

Hard copy to follow soon!

```
*****************************************************************
*                                                        P.01 *
*                     TRANSACTION REPORT                      *
*                     ________________  OCT-15-92 THU 16:09   *
*                                                             *
*    DATE   START        RECEIVER        TX TIME  PAGES  NOTE  *
* ------------------------------------------------------------ *
*   OCT-15 16:06 14159613967              2'36"    4     OK    *
*                                                             *
*****************************************************************
```

ORDER/INVOICE/FULFILLMENT

Acctg. ONLY

Inv. Comp.	By:	Date:	Client #	Order #	Inv. #	Multi-Invoicing of

CUSTOMER/INVOICE TO

ORIGINATOR (Signaure) ____ DATE Oct 14 92

Company	American Express	CA Tax Rate	
Name Mr.~~Ms.~~	Ezra Wohlgemuth	CT Tax 8%	
Position	Vice President	Salutation	
Address	American Express Tower World Financial	State	NY
		Zip	10285
City	NY NY	Country	
Province		Fax	212 619 8936
Phone	212 640 3318	Tlx	

APPROVALS

VP Sales/Res. ____

Date ____

Controller ____

Date ____

Special instructions for invoicing, progress billing, or delayed payments, etc.

Bill ~~[illegible]~~ at end of project (approx Nov 1)

ORDER

Contract Year Beg. ____

End ____

☐ New Order (N1) ☐ Prior Yr (N3)

☐ Renewal (N2) ☐ Cancel

Invoice Type

☐ Fulfillment Only

☐ W/Order (OR)

☐ Monthly (MO)

☐ Quarterly (QT)

☐ Pending

Employee # Sold by:	%	Employee # Commission to:	%
TCP	100	Clark	100

CLIENT AUTH.

PO# ____

INPUT Contract ☒ Letter ☐ Verbal ☐

Attach all authorizing documents to white (contract) copy.

SHIP TO

Company		Province	
Name Mr./Ms.	Same	Salutation	
Position		State	
Address		Zip	
		Country	
City		Phone	

ITEM TYPE

- Subscription (SB)
- Custom (YC/ZC/KC)VC
- Multiclient (MC)
- Reports (RP)
- Copies (CP)
- Consult/Present (PR)
- Newsletter (NL)
- Reimbursed Costs (EX)
- Merger/Acq. (ME)
- Exec Overview (EO)
- Conf/Seminar (CN)

DETAIL

Indicate US, UK, FR, VA	Prod. ID/Year	Item Type Code	Item Description or Title	Quantity	Price	Shipped By	Date
US	YN/AMX	YC	Leveraging FDC Data		$5,000		
			(No expenses covered - will be nominal)				

Fulfillment to be completed in: ☐ Corporate ☐ London ☐ Virginia ☐ France ☐ Other ____

• White - Contract • Green - Fulfillment • Yellow - Invoice • Pink - Originator • Goldenrod - Sales Manager

M&S180 11/90

INPUT

PROJECT WORK STATEMENT

TITLE Leveraging FDC Data

CLIENT American Express

CONTRACT: ATTACHED X TO FOLLOW____ LETTER____ VERBAL____

PROJECT LEADER TCR PROJECT CODE YNAMX

DATE STARTED Oct 14 92 PLANNED COMPLETION DATE Nov 1

LEVEL OF EFFORT(Professional Man Days) 3

TOTAL CONTRACT VALUE: $ or £ 5,000

REVENUE DISTRIBUTION (% or $) INPUT US 100 INPUT LTD____

REIMBURSABLE EXPENSES: NO X

YES____

EXP. BUDGET____ TO COVER: TRAV:____

TELE:____

RPT. PREP.:____

OTHER:____

BILLING SCHEDULE DESCRIPTION End of project

PROJECT DESCRIPTION To assist in developing data/analytic framework to identify business opportunities for using FDC data

INDICATE TYPE OF WORK: REPORT NO PRESENTATION / Info - Yes

THANK YOU PACKAGE: YES____ NO X

ACCOUNTING USE ONLY: ENTERED ON CURRENT PROJECT LIST____

DISTRIBUTI

CONTRACT FILE

LIBRARY FILE

NEW JERSEY

INPUT LTD.

____

Originator

SHEILA (Y&Z on

BINDER COPY

____

Date Typed

- **Issue iteration**
- **Addition material supplied**

INPUT estimates that this could be accomplished in two or three weeks.

INPUT can help clarify issues in "C" in "Scope", but would not supply specific information.

V. FEE

The professional fee for the above services is $5,000, including expenses.

This proposal expires in thirty days unless extended in writing.

AUTHORIZATION

To authorize the project as specified, please sign and return one copy of this proposal, along with the initial fee. Upon acceptance by INPUT, a countersigned copy of the proposal will be returned to American Express.

AUTHORIZED BY:

American Express

Eva Wohlgemuth
Name

VP- CTS- AXP-
Title

10/12/92
Date

ACCEPTED BY:

INPUT

Name

Title

Date

INPUT®

Atrium at Glenpointe, 400 Frank W. Burr Blvd., Teaneck, NJ 07666 Tel. (201) 801-0050
Fax (201) 801-0441

October 22, 1992

Mr. Hyman Gruenberg
American Express
Technology Strategy
World Financial Center
New York, NY 10285

Dear Hyman:

Attached is the initial submission of material. The information seems to have naturally organized itself into the following categories:

- The impact of business changes on IT (which our research shows as very significant)
- The resulting changes in IT
- The overall information services market -- this helps to place any data/information opportunities in perspective
- An overview of the electronic information market
- A look at vertically-focussed information markets

Most of the material is in the form of exhibits, with text to place it in context. If you need more background or explanation we can provide it verbally or in writing.

The exhibit material came from several sources: Published reports, presentation material, work in progress and material prepared especially for this project. Hence, there are differences in format, etc. Since the material is all background material at this stage, this did not seem important. When you get to the stage where you may wish to use material publicly, we will be happy to make it all consistent.

In a few cases, information is preliminary, but I thought it would be useful. In one or two other cases, we are still collecting material, and that has been noted.

If you or you colleagues have any questions, please call me.

Sincerely,

Thomas O'Flaherty
Vice President

a:YNAMX

OCTOBER 1992

BACKGROUND INFORMATION FOR DEVELOPING A STRATEGY TO LEVERAGE FDC DATA

INPUT

The Atrium at Glenpointe, 400 Frank W. Burr Boulevard, Teaneck, NJ 07666 201-801-0050

Published by
INPUT
The Atrium at Glenpointe
400 Frank W. Burr Boulevard
Teaneck, NJ 07666

Background Information for Developing

a Strategy to Leverage FDC Data

The information provided in this report shall be used only by the employees of and within the current corporate structure of INPUT's clients, and will not be disclosed to any other organization or person including parent, subsidiary, or affiliated organizations without prior written consent of INPUT.

INPUT exercises its best efforts in preparation of the information provided in this report and believes the information contained herein to be accurate. However, INPUT shall have no liability for any loss or expense that may result from incompleteness or inaccuracy of the information provided.

YNAMX 100 1992

I

THE IMPACT OF BUSINESS CHANGES ON THE USE OF INFORMATION TECHNOLOGY

For those in the technology business, technology capabilities often appear to be driving technology usage. INPUT's research indicates that the biggest impact in the use of technology is coming from changed organizational relationships within an organization.

- Companies are becoming more decentralized.
- Functional (user) departments are obtaining much more control over their systems direction (Exhibit I-1). These trends are increasing (Exhibit I-2).
  - Note that this particular information came from IS departments which would, if anything, tend to understate these trends.
  - Recent in-depth proprietary studies performed by INPUT strongly support these conclusions.

The organizational model for the use of IS is in a state of change (Exhibit I-3).

- The central IS organization is slipping in terms or importance and influence.
- The most important medium-term trend is the decentralizing of IS resources into departments. This provides user departments with an independent understanding as well as their own IS capabilities. This new model can be very "vendor-friendly":

  - A "mini-IS" group often does not have the critical mass to perform state-of-the-art work (or even, many times, have the resources to handle large new projects).
  - More importantly, user departments are solutions-oriented, not technically oriented: Vendors that offer solutions to business or applications problems will be listened to very carefully; the exact amount and type of IT content in the solution is often of secondary interest.
- The declining cost of client/server hardware is an immediate attraction of the new model of computing, as shown in Exhibit I-4. Several points should be noted:
  - Even now, a "mainframe MIPS" and a "PC MIPS" are not equivalent, because of differing abilities to process large amounts of data as well as the necessary overhead functions found on a mainframe but not on a PC.
  - As improvements are made to micro-processor-based systems (RAID, scalable architectures, scalable DBMS, etc.) these systems are more likely to have the characteristics of the "mini" curve (which would otherwise tend to disappear).
  - There are still significant cost differences, however.
  - Overall systems funding often becomes more readily available where the hardware/software contribution is viewed as a relatively small component of the overall costs of supporting a mission-critical activity.
- Exhibit I-5 summarizes these aspects of the "new paradigm".

Technology does play an important role in the new paradigm but more to accelerate (Exhibit I-6) and to enable (Exhibit I-7). The critical factor is that the organizational environment is now very conducive to exploiting decentralized technology,

As applications decision making becomes more decentralized, so are IT operations generally (including software-related capabilities).

- Operations became very centralized in the late 1970s, largely as a result of the success of the 370 architecture: Even during this period, hardware and software architectures were somewhat more centralized than the underlying organizational structure and applications requirements.

- As user functions became more decentralized in the 1980s, this created strain and tension between the central IS function and its customers. First the PC and now client/server models have helped in the "transfer of power".

- These changing relationships are shown in Exhibit I-8. The lagging of the changes in IT operations behind user needs (i.e., applications) explains much of IBM's recent pain, for example.

- By the late 1990s the business decentralization trend should have run its course. In any event the business and IT worlds will be far more decentralized than 15 years earlier.

Exhibit I-9 illustrates these changes in a different way. This exhibit takes the two lines in Exhibit I-8 and plots them on separate axes. The result is an almost complete circle: This ongoing change is an important reason why both traditional IS departments and vendors have often been out of synch with user needs at critical turning points.

II
CHANGES IN INFORMATION TECHNOLOGY

By far the biggest change in IT technology now underway is the move toward client/server technology (see Exhibit II-1 for a working definition of "client/server").

- The largest switch will come in personal productivity applications, since the changes will be relatively easy to make (Exhibit II-2).
- Mission-critical applications, i.e., those used on a large-scale to perform important business functions, will grow faster overall (Exhibit II-3; however, even after five years client/server applications will still represent a minority of mission-critical applications.
    - The time to convert is much greater than for personal productivity applications.
    - More importantly, the software to efficiently support such change is just appearing on the horizon.
- Note: Exhibits II-2 and II-3 are from analysis that has not been completed; the numbers may be adjusted somewhat in the final version. However, this information was deemed to be useful to American Express in its planning, as long as they are treated as preliminary data.

Software has its own product cycles. These cycles are determined by external changes (e.g., the changes in the business organization described in section I) and product/technical changes and capabilities; see Exhibit II-4. However, there are many issues and challenges facing the software community before client/server technology can be supported effectively. These issues also affect American Express's where its plans intersect this technology.

- There are (too) many platforms to target (Exhibit II-5).

- A key interface for external products and services will be the server database environment (Exhibit II-6). There are even more products to interface with and attrition in this category will be slow.

- From the standpoint of an external supplier, the GUI interface with end users is also critical (Exhibit II-7). Given the resources involved with writing GUIs, simplification and standardization is very important. However, platform suppliers currently see controlling a proprietary GUI as very important.

- Client/server development tools (Exhibit II-8) represent a special opportunity and/or barrier.

    - If these tools are able to work in multiple environments, then some of the other interface problems may diminish.

    - However, there is no sign of a client/server tool standard emerging or that these vendors can in fact provide the kind of support required (Exhibit II-9).

- A larger problem is that no tool yet provides assistance in the critical areas of segmenting data or processing. This is a problem which goes back to the mid-1980s when micro-mainframe links and LU6.2 were first being explored. Exhibit II-10 was first developed in 1984; only the words "client" and "server" have been added!

A downsized environment will mean that outside developers will also have to potentially interface with a wide variety of environment and types of users (Exhibit II-11).

III
THE INFORMATION SERVICES MARKET

ENVIRONMENT: OVERVIEW

Exhibit III-1 shows how INPUT divides the information services market from a functional, or delivery mode, standpoint. INPUT also analyzes the market by industry and application.

Exhibit III-2 shows the forecast for the entire market. Note: Dollar figures are non-captive revenues and are expressed in constant dollars (for this period an inflation rate of about 4% is assumed).

Exhibit III-3 shows the growth by major delivery modes. (American Express components are now active in processing and outsourcing.) Exhibit III-4 shows the market overview for Electronic Information Services (i.e., the delivery of information).

IV

ELECTRONIC INFORMATION MARKET: OVERVIEW

A

Market Sizing and Competitors

Exhibit IV-1 breaks out the market by vertical industry.

The characteristics of different sizes of vendors are shown in Exhibit IV-2.

- The largest vendors are shown in Exhibit IV-3. This list has been relatively stable for several years. These vendors have been trying to adjust to the new decentralized environment with mixed success.

- The market focus of the leading vendors is shown in Exhibit IV-4.

B

Types of Data/Information

It is very useful to segment the electronic information market by the type of information supplied. Generally, there are greater rewards for supplying more complex information. Data can be classified as

- Simple or compound

- Generic or proprietary

Exhibit IV-5 provides an overview of the differences and Exhibit IV-6 provides contrasting examples in one area, demographics.

Exhibits IV-7 through IV-10 provide examples of each combination. In the real world examples do not fall neatly into these categories; however, they are quite useful for analysis and planning.

There is increasing movement into the higher value categories.

- Exhibit IV-11 shows how traditional packaged goods market analysis has not been able to unite data at the individual household level.
- Exhibits IV-12 and IV-13 show approaches for uniting data on individual households as close to the buying point as possible.

Electronic distribution of data overlaps other delivery mechanisms (Exhibit IV-14), especially providing data as part of a processing service. There has been remarkably little movement so far to package information as part of separately billed consulting services.

V
VERTICALLY-FOCUSSED INFORMATION

The majority of information niches are vertically oriented. This section provides information on two niches:

- Grocery/food
- Health care

In addition, this section will address several specific questions raised by American Express on the financial services sector.

In this section the term "electronic commerce" is often used. This concept -- which unites information, processing and, sometimes, outsourcing -- could be a useful objective, or at least planning alternative, for some of American Express's future initiatives.

A
Grocery/Food

American Express will not necessarily offer information products for this sector. However, this sector is representative of packaged goods, which is the largest and most sophisticated of the information-consuming sectors. Lessons learned here may be applicable in sectors that are less developed from an information standpoint.

Exhibits V-1 and V-2 show the flow of trade (hence, information) between different sub-sectors.

- Exhibit V-3 shows the types of potential electronic commerce services used by the different sub-sectors.
- The major vendors providing electronic commerce services are listed in Exhibit V-4.

- The major vendors for one service group, product movement data, is shown in Exhibit V-5.
- The size of the market, broken down into major service groups is shown in Exhibit V-6. With small exceptions these represent processing or information-provision services.

B

Health Care

Exhibit V-7 shows the trading relationships between different parts of the health care sector. The input-output matrix in Exhibit V-8 shows the major areas of interaction. (Note: The entities identified by the horizontal "Requestor" numbers are the same as those shown vertically.)

Electronic commerce in this market is expected to grow at a 28% annual rate (Exhibit V-9), with claims processing and electronic information accounting for a majority of expenditures. Leading information suppliers are shown in Exhibit V-10.

C

Financial Services

This section addresses the three card/bank processing questions on the "Trends" list of questions.

1. Third Party, High Volume Billing Systems

There has been limited success for high volume (i.e., transaction processing) billing systems offered on a software-only basis by third parties.

- Card processors (whether operating on a service basis or for internal use) have developed their own proprietary systems. In most cases these would be very hard to commercialize because of poor code, non-existent documentation or for other reasons. Where systems are good these are seen as a competitive advantage. Given the fact that the number of entities processing cards is declining overall, there is a question as to whether there would be a market in any event (at least for the traditional platforms).

- There have been large scale banking software systems offered in the 1980s which included billing modules. These products developed by Uccel (Computer Associates), Cullinet (Computer Associates) and Hogan, among others have not been significant commercial successes. EDS's project in conjunction with Banc One and Norwest may develop a more viable product, although it is not clear if its architecture will be attractive.

- The large scale system that Mellon Bank uses for processing contracts has been sold to other parties, but there have been questions about the financial success of this effort.

- INPUT has been tracking banking software for some time (see Exhibit V-11) and has not seen much activity here.

- There are commercial products available for utility and other billing, but these are designed for much more controlled environments than in card processing and banking and are not really comparable.

2. Outsourcing of Credit Card and Other Billing

INPUT is still in the process of developing precise numbers in this area. However, several trends are apparent:

- The universe of banks is shrinking overall due to mergers.

- Few, probably no, banks are taking back from current processors credit card business.

- Banks have been selling off entire credit card portfolios and have been contracting for processing to third parties.

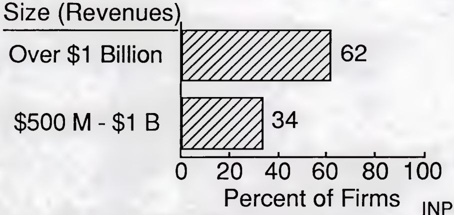
It is not clear if significant decreases in hardware costs would tempt banks back into operating their own processing.

3. Breaking Down Barriers to Entry

Briefly, POS data entry is sweeping all other entry modes aside. INPUT sees POS data entry as having a neutral effect on the competitive environment:

- POS entry will place somewhat greater emphasis on technology, helping established players, who are generally already investing in technology..
- On the other hand, POS networks (for both approval and data entry) represent duplication and inefficiency. There is a functional need for only a small number of competing networks (as has happened in ATM networks). This trend could ultimately place pressure on the card processors if they have to use competitors' networks.
- Some entrepreneurs are considering further innovations in "smart card" and related technology that might have an impact on POS and network utilization.

User Departments with More Applications Decision Making Than IS



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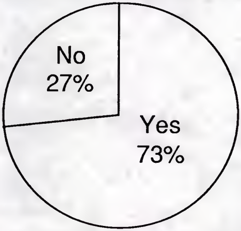
SP-226

Source: Interviews with 67 IS departments

Notes

10/16/92

Role of Users Is Increasing (As perceived by IS)



SP-227 Source: Interviews with 67 IS departments

INPUT

Notes

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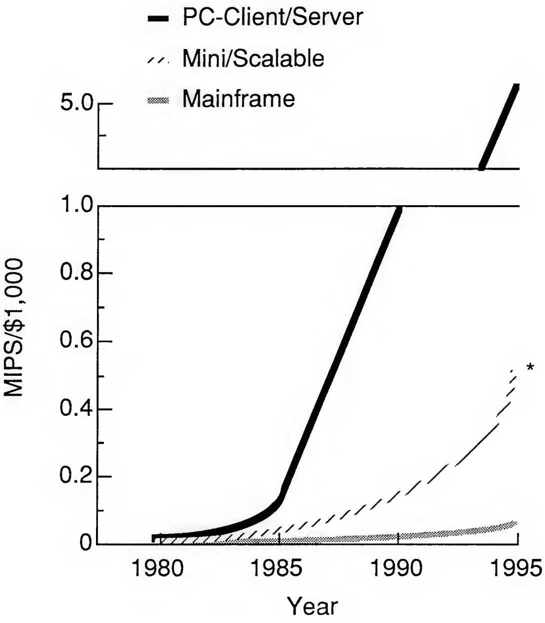
I-3 Will Follow

MIPS/$1,000



* Includes scalable processors, e.g., NCR 3000 series.

Sources: Dataquest, Yankee, INPUT

New Paradigm

- Business-driven applications
- "Mini-IS" functions in user departments
- End-user programming
- Systems funding more readily available
- Lower hardware costs

INPUT

SP-234

Notes

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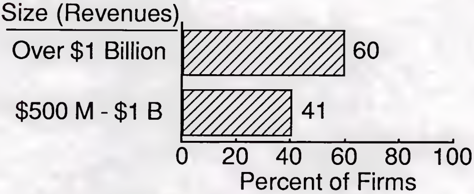
Technology Change Accelerating Applications Replacement



Source: Interviews with 67 IS departments

INPUT

Notes

Technology as Enabler

- Client/server products
- LAN-based environments
- Object-oriented development

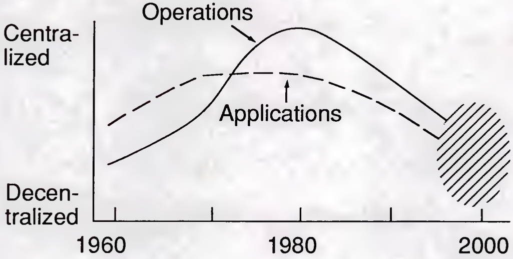
INPUT

SP-235

Notes

10/16/92

IT Trends



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SP-229

Notes

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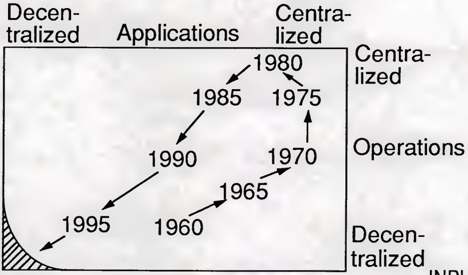
Full Circle



Decentralized

Applications

Centralized

Centralized

Operations

Decentralized

1960

1965

1970

1975

1980

1985

1990

1995

INPUT

SP-230

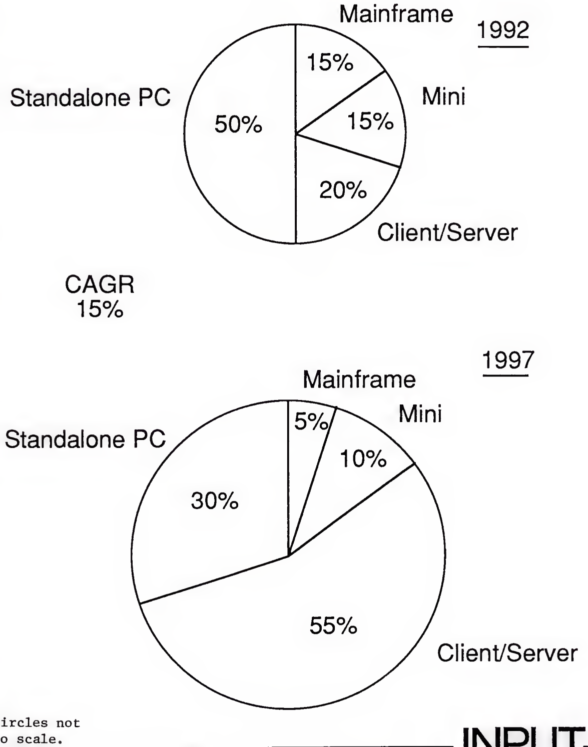
Notes

CLIENT/SERVER DEFINITION

- LAN-based, including
  - Interconnected LANs
  - Connections to minis, mainframes
- Shared data
- Probably, microprocessor-based (including "scalable" architectures)
- Possibly, segmented processing

Personal Productivity Applications Growth and Location (Spreadsheet, WP, E-Mail)

Preliminary



*Circles not to scale.

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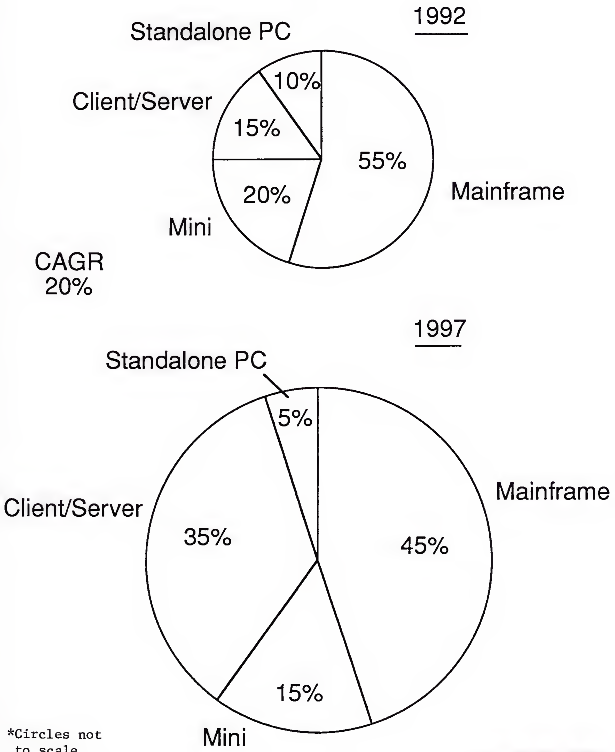
Mission-Critical Applications Growth and Location

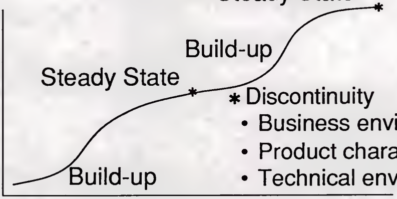
Preliminary



*Circles not to scale.

INPUT

Software Products Cycles



Steady State

Build-up

Steady State

Build-up

Cumulative Installations

* Discontinuity

- Business environment
- Product characteristics
- Technical environment

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SP-223

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CLIENT/SERVER PLATFORMS

- Contenders (alphabetic order)
  - Apple
  - NT
  - OS/2
  - UNIX
  - Windows
- Converging functionality
- Consolidation slowed by distributed buying points?

DATABASE INTERFACE (SERVER)

- **Many choices, e.g.,**

  - **DB2**
  - **HP**
  - **Informix**
  - **Ingres**
  - **Oracle**
  - **Rdb**
  - **SQL Server**
  - **Sybase**

- **Mini retrofits**

- **No obvious dominance**

GUIs (CLIENT)

- GUI almost half of coding for C/S application: attraction of common GUI
- Common user access doesn't mean standard GUI
- Proprietary platform-supplier: little incentive for common GUIs
- End users may not care

C/S TOOLS: SUPERSET INTERFACE??

Examples

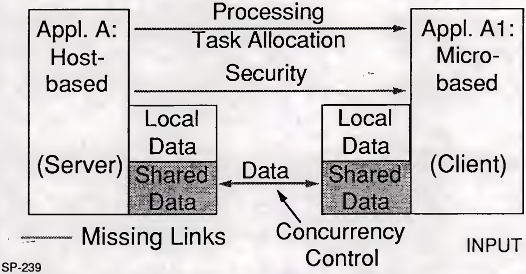
- Easel
- Ellipse
- Gupta SQL
- Mozart
- Powerbuilder
- Viewpoint

C/S TOOL ISSUES

- Many-to-many interfaces
- Small vendors
- Incomplete solutions (design only)
- Proprietary shortcuts

Still Not Solved!

Shared Functionality: Missing Links



Appl. A: Host-based

(Server)

Processing

Task Allocation

Security

Appl. A1: Micro-based

(Client)

Local Data

Shared Data

Data

Local Data

Shared Data

Concurrency Control

Missing Links

SP-239

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Notes

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Downsized Development Environments

Target Environment	Developers Power User	Vendor	Mini-IS
(Shared) Host		✓✓	✓✓
C/S	✓✓	✓✓	✓
PC/Workstation	✓✓	✓	✓

INPUT

SP-236

Notes

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Information Services Industry Structure

Systems Software Products
- Mainframe
- Minicomputer
- Workstation/ PC

Applications Software Products
- Mainframe
- Minicomputer
- Workstation/ PC

Turnkey Systems
- Equipment
- Software Products
- Professional Services

Equipment Services
- Equipment Maintenance
- Environmental Services

Professional Services
- Consulting
- Education & Training
- Software Development Maintenance
- Application Management

Systems Integration
- Equipment
- Software Products
- Professional Services
- Other

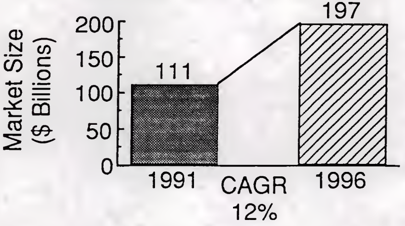
Systems Operations
- Platform
- Applications
- Desktop Services
- Network Management

Processing Services
- Transaction
- Utility
- Other

Network Services
- Electronic Information Services
- Network Applications

Source: INPUT

U.S. Information Services Market, 1991-1996



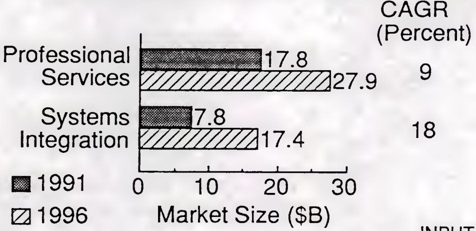
MF-3

INPUT

Notes

10/29/91

U.S. Information Services Market, 1991-1996



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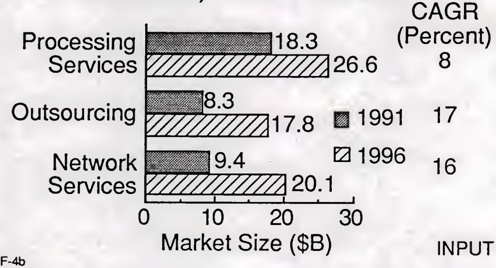
Notes

U.S. Information Services Market, 1991-1996



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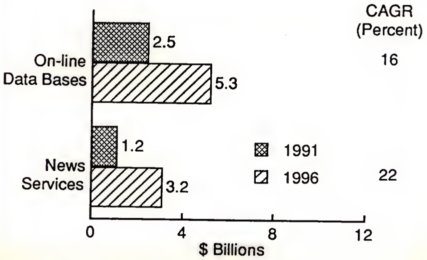
MF-4b

Notes

6/10/92

Electronic Information Services Market by Submode, 1991-1996



Electronic Information Services Market User Expenditures by Industry, 1991-1996

Industry Sector	User Expenditures $ Millions 1991	User Expenditures $ Millions 1996	1991-1996 CAGR Percent
Discrete Manufacturing	43	114	21
Process Manufacturing	708	1,400	15
Transportation	226	486	17
Utilities	25	37	8
Telecommunications	90	204	18
Wholesale Distribution	63	118	13
Retail Distribution	125	286	18
Banking and Finance	750	1,500	15
Insurance	171	317	13
Medical	304	556	13
Education	120	269	18
Business Services	575	1,154	15
Federal Government	334	440	6
State and Local Government	44	90	15
Miscellaneous Industries	118	227	14
Industry-Specific Total	3,696	7,198	14
Cross-Industry	3,723	8,417	18
Total EIS	7,419	15,615	16

Comparison of Electronic Information Services and Network Application Vendors

Characteristic	EIS	Network Application
Largest Vendors	Publishers. Subsidiaries of large companies interested in revenue potential of EIS	Communication vendors. IS vendors exploiting network capabilities
Midsized and Smaller Vendors	Chiefly companies who offer EIS products related to their businesses. There are many small vendors.	IS vendors and users gaining revenue from their investments in network applications. Few small vendors.
Other Vendors	More than half of large vendors and a higher percentage of smaller specialize in EIS.	Larger venders offer multiple information services. A number of EDI providers also market EDI software.
Revenue of Vendors	There are ten vendors earning over $200 million.	Five vendors earn over $100 million.

Leading Vendors of Electronic Information Services

Rank	Vendor	Estimated Revenue ($ Millions)	Market Share (Percent)
1	TRW (including Chilton)	700	11
2	Dow Jones (Telerate)	425	7
3	Dun & Bradstreet	415	6
4	Mead Data Central	410	6
5	Equifax	390	6
6	Reuters	372	6
7	McGraw-Hill	325	5
8	Citicorp (Quotron)	195	3
9	Knight-Ridder (& Dialog)	172	2
10	ADP	154	2
11	CSC	75	1
12	CompuServe	70	1
13	PMS	69	1

Leading On-Line Data Base Vendor Market Focus

Company	Credit Information	Securities Prices	Vertical Specialty	Business Information
Dun & Bradstreet	X	-	-	X
Equifax	X	-	X	-
TRW	X	-	-	-
Reuters	-	X	-	-
ADP	-	X	-	-
Citicorp (Quotron)	-	X	-	-
McGraw-Hill	-	X	X	X
Dow Jones (Telerate)	-	X	-	X
Mead Data Central	-	-	X	-
Computer Sciences Corp.	X	-	-	-
CompuServe	-	-	-	X
Knight-Ridder (Dialog)	-	X	-	X

DATA TYPES: OVERVIEW

	Simple	Compound
Generic	• Public and/or • Competitively available • Differential: time/usability • Low value	• Competitive • Value in analysis • Low to medium value
Proprietary	• Higher cost to collect • Smaller number of competitors • Medium value	• Often unique • Difficult to create • May have public acceptance problems ("1984") • High value

DATA TYPES: DEMOGRAPHIC EXAMPLES

	Simple	Compound
Generic	• Census Data • Address lists	• Socio-economic classification of households
Proprietary	• Frequent shopper data • Direct mail purchase profiles	• Differential effects of media use on consumer behavior (scanning and media tracking)

SIMPLE/GENERIC EXAMPLES

- Census
- Address lists
- NYSE trading
- Newspaper data bases
- Econometric time series
- Motor vehicle registration
- Drivers license data (including violations)
- Public company financials

COMPOUND/GENERIC EXAMPLES

- Household classification
- Economic forecasts
- Public company financials plus trading history
- Indexed news
- Indexed publications in a common field (science, medicine, etc.)
- Auto insurance risks by geographic area

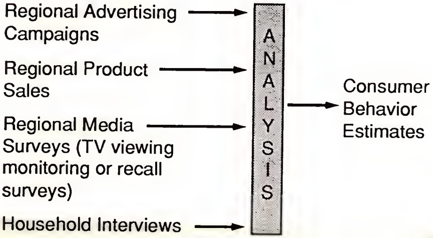
SIMPLE/PROPRIETARY EXAMPLES

- Government bond trading
- Foreign exchange trading
- Media audience measurement
- Direct mail purchase profiles
- Credit history
- Legal opinions
- Product movement tracking (prescriptions written, food, FC packaged goods)
- Insurance claims history

COMPOUND/PROPRIETARY EXAMPLES

- Direct mail purchase profiles with demographics
- Auto insurance rate setting
- Credit history plus demographics: credit scoring
- Scanning plus demographic data
- Scanning plus media data
- Scanning plus differential media data
- English language search of legal opinion database

Traditional Packaged Goods Market Analysis



Regional Advertising Campaigns

Regional Product Sales

Regional Media Surveys (TV viewing monitoring or recall surveys)

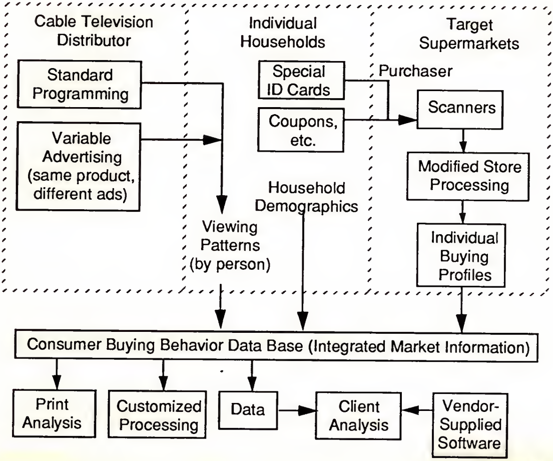
Household Interviews

ANALYSIS

Consumer Behavior Estimates

INPUT

Adding Value to Information: Individualized Market Analysis



Cable Television Distributor

Standard Programming

Variable Advertising (same product, different ads)

Individual Households

Special ID Cards

Coupons, etc.

Household Demographics

Viewing Patterns (by person)

Target Supermarkets

Purchaser

Scanners

Modified Store Processing

Individual Buying Profiles

Consumer Buying Behavior Data Base (Integrated Market Information)

Print Analysis

Customized Processing

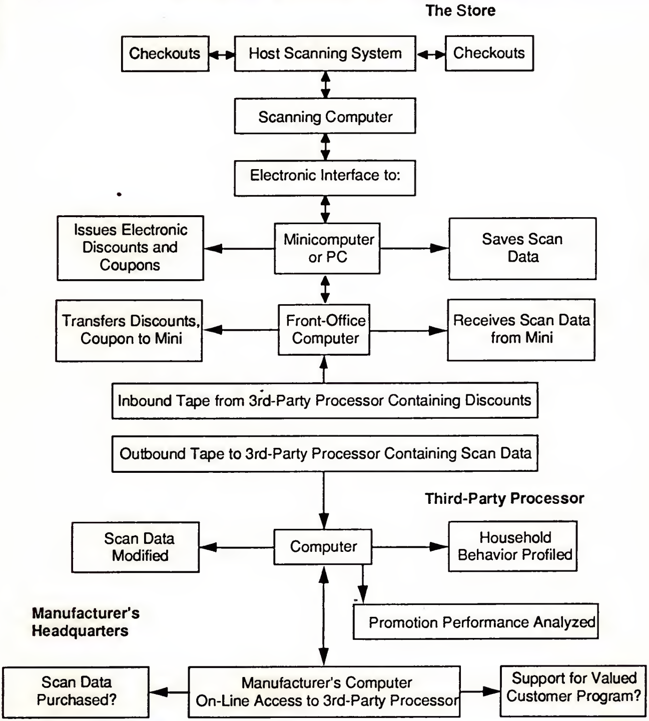
Data

Client Analysis

Vendor-Supplied Software

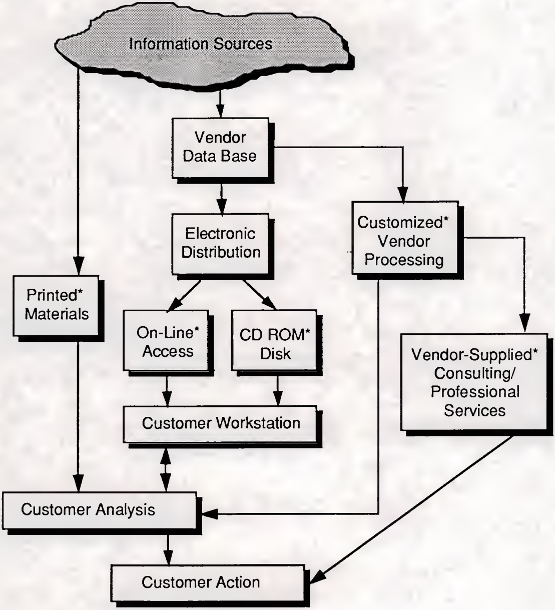
INPUT

Data Flow for a Frequent Shopper Program


The Store
Checkouts
Host Scanning System
Checkouts
Scanning Computer
Electronic Interface to:
Issues Electronic Discounts and Coupons
Minicomputer or PC
Saves Scan Data
Transfers Discounts, Coupon to Mini
Front-Office Computer
Receives Scan Data from Mini
Inbound Tape from 3rd-Party Processor Containing Discounts
Outbound Tape to 3rd-Party Processor Containing Scan Data
Third-Party Processor
Scan Data Modified
Computer
Household Behavior Profiled
Promotion Performance Analyzed
Manufacturer's Headquarters
Scan Data Purchased?
Manufacturer's Computer On-Line Access to 3rd-Party Processor
Support for Valued Customer Program?

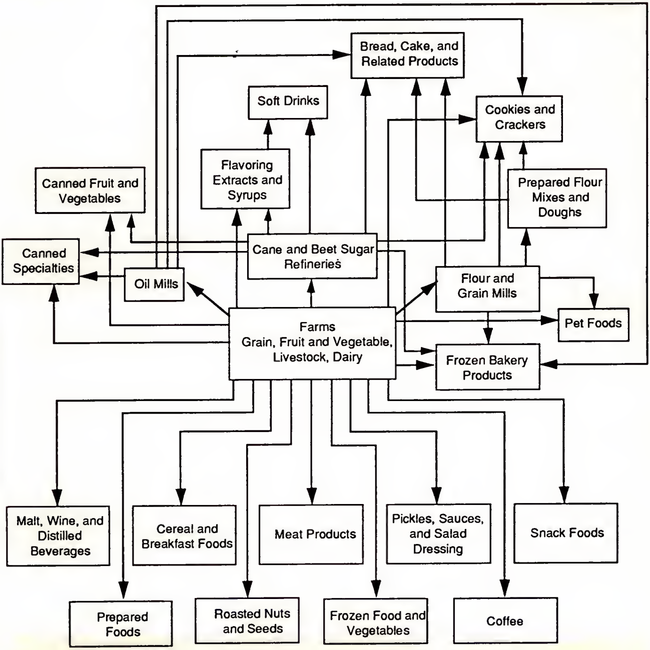
Source: *Progressive Grocer*

Information Products: Alternate Delivery Modes

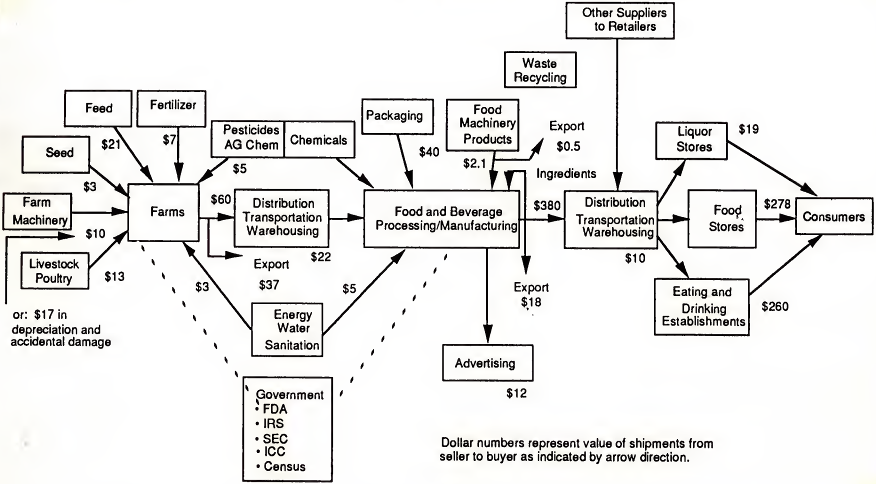


* Delivery mode

The Food Manufacturing Trade Community


Bread, Cake, and Related Products
Soft Drinks
Cookies and Crackers
Flavoring Extracts and Syrups
Canned Fruit and Vegetables
Prepared Flour Mixes and Doughs
Canned Specialties
Cane and Beet Sugar Refineries
Oil Mills
Flour and Grain Mills
Pet Foods
Farms Grain, Fruit and Vegetable, Livestock, Dairy
Frozen Bakery Products
Malt, Wine, and Distilled Beverages
Cereal and Breakfast Foods
Meat Products
Pickles, Sauces, and Salad Dressing
Snack Foods
Prepared Foods
Roasted Nuts and Seeds
Frozen Food and Vegetables
Coffee

Grocery Trading Community: Players and Trade Flows
($ Billions)



Other Suppliers to Retailers

Waste Recycling

Feed

Fertilizer

Seed

$21

$7

Pesticides AG Chem

Chemicals

$5

Packaging

$40

Food Machinery Products

$2.1

Export $0.5

Ingredients

Farm Machinery

$3

Farms

$60

Distribution Transportation Warehousing

$10

Livestock Poultry

$13

or: $17 in depreciation and accidental damage

Export $37

$22

$3

$5

Energy Water Sanitation

Food and Beverage Processing/Manufacturing

$380

Export $18

Distribution Transportation Warehousing

$10

Liquor Stores

$19

Food Stores

$278

Consumers

Eating and Drinking Establishments

$260

Advertising

$12

Government
- FDA
- IRS
- SEC
- ICC
- Census

Dollar numbers represent value of shipments from seller to buyer as indicated by arrow direction.

Electronic Commerce Services in the Food Community

- Food Stores
  - Direct debit at POS
  - Credit card authorization/payment
  - Check authorization
  - Check guarantee
  - Electronic benefits transfer (food stamps)
  - Electronic marketing
  - Product movement data services
  - Lottery
  - Recycling charge-backs
  - In-store ATMs
  - EDI (DEX/UCS, DSD authorized lists)
  - EDI/EFT tax payments
  - Third-party prescription eligibility
  - Home shopping networks
  - Electronic mail
  - Network/processing services for independent grocers
  - In-store radio advertising

Electronic Commerce Services in the Food Community

- Restaurants
  - Credit card authorization
  - Network/processing services for institutions/restaurants
  - IVR and facsimile ordering systems for institutions and restaurants
  - EDI
- Food Manufacturers
  - EDI (with distributors, brokers, other manufacturers, growers, facilities construction)
  - EDI/EFT tax payments
  - Product movement data services
  - Commodity market quotations
  - EDI/EFT payments between food manufacturers and buyers
  - IVR and facsimile systems for food distributors
  - Hand-held, paging, dispatch systems for in-field personnel
- Agriculture
  - Commodity market quotations (cooperative networks, grower to grower)
  - Network/processing services for growers/agribusiness
  - EDI (growers, farm supply vendors, distributors)
- Other data base services not elsewhere classified

Leading Electronic Commerce Vendors in the Grocery Trading Community

	Direct Debit at POS	Debit Processing	Credit Card Issuing	Credit Card Authorization	Credit Card Processing	POS Software	Check Auth./Guar.	EDI	Prod. Movement Data Svcs.	Electronic Marketing	Commodity Market Quotations	POS, ATM, other Hardware	Telecom Network Svcs.	EFT Software	Home Shopping	Packet Switched Network Svcs.	IVR Software Turnkey Products	Genl. EFT Payment Svcs.
Citicorp	✓	✓	✓		✓				✓	✓	✓							✓
EDS		✓			✓			✓								✓		
NDC		✓		✓	✓												✓	
Dun & Bradstreet				✓		✓			✓	✓	✓			✓				
American Express		✓	✓		✓					✓								
Sterling Software								✓	✓					✓				
GEIS								✓						✓		✓		
BT North America								✓						✓		✓		
Information Resources									✓									
TRW				✓														
AT&T			✓		✓	✓		✓				✓	✓			✓	✓	
First Financial Mgt. Corp.				✓	✓													
Deluxe Data Systems		✓			✓	✓												
EquiFax		✓		✓	✓		✓											
IBM								✓				✓			✓	✓		
Visa			✓		✓											✓		✓
Sears			✓	✓				✓								✓		

INPUT

Product Movement Data Services Vendors in Food Production Distribution

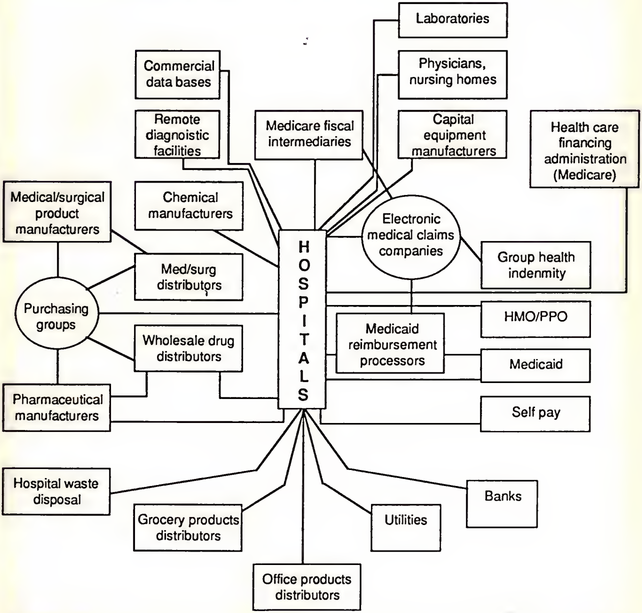
Company	1990 U.S. Revenues ($ Millions)	Market Share (Percent)
The Dun & Bradstreet Corporation (Nielsen Marketing Research)	270	60
Information Resources, Inc.	136	30
Citicorp POS Information Services, Inc.*	20	5
Other	24	5
Total	450	100

*Citicorp's POS ISI estimated total revenues of $20 million in 1990 were arbitrarily split between product movement and elective marketing

User Expenditures on Key Electronic Commerce Software and Services

Software/ Service	1990 Expenditure ($ Millions)
EDI	20
Card Processing	510
Check Authorization	200
Electronic Marketing	100
Product Movement	450
Commodity Markets	300
Other	200
Total	1,780

The Health Care Trading Community


Laboratories
Commercial data bases
Physicians, nursing homes
Remote diagnoistic facilities
Medicare fiscal intermediaries
Capital equipment manufacturers
Health care financing administration (Medicare)
Medical/surgical product manufacturers
Chemical manufacturers
Electronic medical claims companies
Med/surg distributors
Group health indenmity
HOSPITALS
Purchasing groups
HMO/PPO
Medicaid reimbursement processors
Wholesale drug distributors
Medicaid
Pharmaceutical manufacturers
Self pay
Hospital waste disposal
Banks
Grocery products distributors
Utilities
Office products distributors

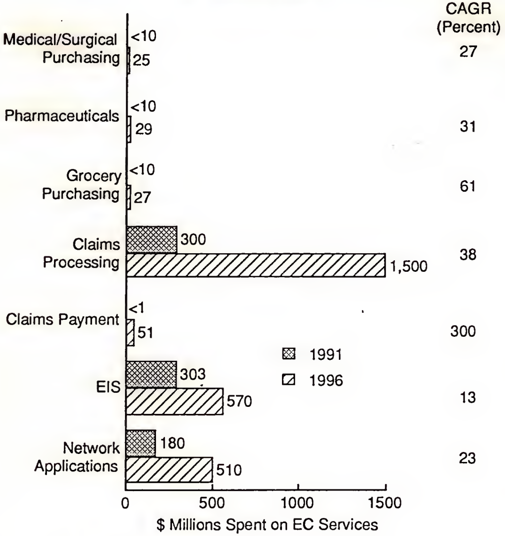
Input-Output Matrix of Health Care Electronic Commerce Activity

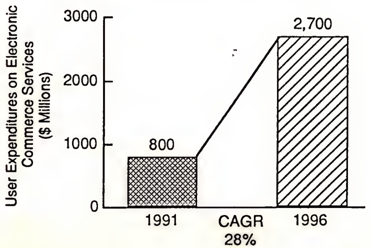
REQUESTORS (PAYING MONEY)

(FULFILLERS (RENDERING PRODUCTS OR SERVICES)

	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29
Supplies									▨			▨	▨											▨					
1 Pharmaceuticals										▨		▨	▨											▨					
2 Med./Surgical												▨												▨					
3 Grocery												▨												▨					
4 Office supplies	▨	▨										▨												▨					
5 Chemicals												▨												▨					
6 Cap. equip.												▨																	
7 Energy												▨																	
8 Waste												▨																	
Services																													
9 Pharm. dist.												▨	▨																
10 Med./surg. dist.												▨	▨																
11 Transportation		▨							▨	▨	▨	▨																	
12 Hospitals												▨											▨		▨		▨	▨	▨
13 Pharmacies												▨											▨				▨	▨	▨
14 HMO/PPO												▨											▨		▨		▨	▨	▨
15 Long-term												▨											▨				▨	▨	▨
16 Doctors												▨											▨				▨	▨	▨
17 Laboratories												▨	▨														▨	▨	▨
18 Diagnostic fac.												▨	▨														▨	▨	▨
19 Universities												▨																	
20 Publishers	▨	▨										▨					▨	▨				▨							
21 Claims processors												▨	▨																
22 VANs	▨	▨										▨																	
23 Fiscal Intermediaries												▨																	
24 Buying groups												▨																	
25 Managed care																													▨
Finance																													
26 Banks																													
27 Medicare/caid																													▨
28 Private insurers																													▨
29 Patient/employer																												▨	

Electronic Commerce Service Markets for Health Care





Health Care Electronic Information Service Providers

- DRI/McGraw-Hill
- BRS
- Data-Star
- DIALOG Information Services, Inc.
- IMS America, Ltd.
- Strategic Intelligence Systems, Inc.
- Mead Data Central
- National Library of Medicine
- NewsNet, Inc.
- ORBIT Search Service
- Executive Telecom System, Inc.
- National Planning Data Corporation

BANKING SOFTWARE PRODUCTS: 1987 AND 1991 MARKET SHARES

1987			1991	
Rank	Name	Share	Rank	Share
1	IBM	8%	1	5%
2	Unisys	6	3	2
3	NCR	5	2	3
4	SEI	3		*
5	Kirchman	3	6	2
6	Computer Associates	3	10	1
7	CIR	2		*
8	AMS	2	4	2
9	M&I	2	11	1
10	Cullinet	2	a	a
11	CDC	1	b	b
12	Systematics	1	13	1
13	Mellon	1		*
14	FIData	1		*
15	Hogan	1	12	1
16	Stockholder Systems	1		*
17	DEC	1	7	2
18	D&B Software	*	5	2
19	AGS	*	9	2
20	EDS	*	8	2
	SCS Compute	*	14	1
	Logica	*	15	1
	Shared Financial	*	16	1
	Sterling	*	17	1

* = Under 1%   a = Acquired by Computer Associates   b = Exited

OCTOBER 1992

BACKGROUND INFORMATION FOR DEVELOPING A STRATEGY TO LEVERAGE FDC DATA

INPUT

The Atrium at Glenpointe, 400 Frank W. Burr Boulevard, Teaneck, NJ 07666 201-801-0050

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INPUT
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400 Frank W. Burr Boulevard
Teaneck, NJ 07666

Background Information for Developing

a Strategy to Leverage FCS Data

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YNAMX 100 1992

I

THE IMPACT OF BUSINESS CHANGES ON THE USE OF INFORMATION TECHNOLOGY

For those in the technology business, technology capabilities often appear to be driving technology usage. INPUT's research indicates that the biggest impact in the use of technology is coming from changed organizational relationships within an organization.

- Companies are becoming more decentralized.
- Functional (user) departments are obtaining much more control over their systems direction (Exhibit I-1). These trends are increasing (Exhibit I-2).
  - Note that this particular information came from IS departments which would, if anything, tend to understate these trends.
  - Recent in-depth proprietary studies performed by INPUT strongly support these conclusions.

The organizational model for the use of IS is in a state of change (Exhibit I-3).

- The central IS organization is slipping in terms or importance and influence.
- The most important medium-term trend is the decentralizing of IS resources into departments. This provides user departments with an independent understanding as well as their own IS capabilities. This new model can be very "vendor-friendly":

  - A "mini-IS" group often does not have the critical mass to perform state-of-the-art work (or even, many times, have the resources to handle large new projects).
  - More importantly, user departments are solutions-oriented, not technically oriented: Vendors that offer solutions to business or applications problems will be listened to very carefully; the exact amount and type of IT content in the solution is often of secondary interest.

- The declining cost of client/server hardware is an immediate attraction of the new model of computing, as shown in Exhibit I-4. Several points should be noted:
  - Even now, a "mainframe MIPS" and a "PC MIPS" are not equivalent, because of differing abilities to process large amounts of data as well as the necessary overhead functions found on a mainframe but not on a PC.
  - As improvements are made to micro-processor-based systems (RAID, scalable architectures, scalable DBMS, etc.) these systems are more likely to have the characteristics of the "mini" curve (which would otherwise tend to disappear).
  - There are still significant cost differences, however.
  - Overall systems funding often becomes more readily available where the hardware/software contribution is viewed as a relatively small component of the overall costs of supporting a mission-critical activity.
- Exhibit I-5 summarizes these aspects of the "new paradigm".

Technology does play an important role in the new paradigm but more to accelerate (Exhibit I-6) and to enable (Exhibit I-7). The critical factor is that the organizational environment is now very conducive to exploiting decentralized technology,

As applications decision making becomes more decentralized, so are IT operations generally (including software-related capabilities).

- Operations became very centralized in the late 1970s, largely as a result of the success of the 370 architecture: Even during this period, hardware and software architectures were somewhat more centralized than the underlying organizational structure and applications requirements.

- As user functions became more decentralized in the 1980s, this created strain and tension between the central IS function and its customers. First the PC and now client/server models have helped in the "transfer of power".

- These changing relationships are shown in Exhibit I-8. The lagging of the changes in IT operations behind user needs (i.e., applications) explains much of IBM's recent pain, for example.

- By the late 1990s the business decentralization trend should have run its course. In any event the business and IT worlds will be far more decentralized than 15 years earlier.

Exhibit I-9 illustrates these changes in a different way. This exhibit takes the two lines in Exhibit I-8 and plots them on separate axes. The result is an almost complete circle: This ongoing change is an important reason why both traditional IS departments and vendors have often been out of synch with user needs at critical turning points.

II
CHANGES IN INFORMATION TECHNOLOGY

By far the biggest change in IT technology now underway is the move toward client/server technology (see Exhibit II-1 for a working definition of "client/server").

- The largest switch will come in personal productivity applications, since the changes will be relatively easy to make (Exhibit II-2).
- Mission-critical applications, i.e., those used on a large-scale to perform important business functions, will grow faster overall (Exhibit II-3; however, even after five years client/server applications will still represent a minority of mission-critical applications.
  - The time to convert is much greater than for personal productivity applications.
  - More importantly, the software to efficiently support such change is just appearing on the horizon.
- Note: Exhibits II-2 and II-3 are from analysis that has not been completed; the numbers may be adjusted somewhat in the final version. However, this information was deemed to be useful to American Express in its planning, as long as they are treated as preliminary data.

Software has its own product cycles. These cycles are determined by external changes (e.g., the changes in the business organization described in section I) and product/technical changes and capabilities; see Exhibit II-4. However, there are many issues and challenges facing the software community before client/server technology can be supported effectively. These issues also affect American Express's where its plans intersect this technology.

- There are (too) many platforms to target (Exhibit II-5).
- A key interface for external products and services will be the server database environment (Exhibit II-6). There are even more products to interface with and attrition in this category will be slow.
- From the standpoint of an external supplier, the GUI interface with end users is also critical (Exhibit II-7). Given the resources involved with writing GUIs, simplification and standardization is very important. However, platform suppliers currently see controlling a proprietary GUI as very important.
- Client/server development tools (Exhibit II-8) represent a special opportunity and/or barrier.
    - If these tools are able to work in multiple environments, then some of the other interface problems may diminish.
    - However, there is no sign of a client/server tool standard emerging or that these vendors can in fact provide the kind of support required (Exhibit II-9).
- A larger problem is that no tool yet provides assistance in the critical areas of segmenting data or processing. This is a problem which goes back to the mid-1980s when micro-mainframe links and LU6.2 were first being explored. Exhibit II-10 was first developed in 1984; only the words "client" and "server" have been added!

A downsized environment will mean that outside developers will also have to potentially interface with a wide variety of environment and types of users (Exhibit II-11).

III
THE INFORMATION SERVICES MARKET ENVIRONMENT: OVERVIEW

Exhibit III-1 shows how INPUT divides the information services market from a functional, or delivery mode, standpoint. INPUT also analyzes the market by industry and application.

Exhibit III-2 shows the forecast for the entire market. Note: Dollar figures are non-captive revenues and are expressed in constant dollars (for this period an inflation rate of about 4% is assumed).

Exhibit III-3 shows the growth by major delivery modes. (American Express components are now active in processing and outsourcing.) Exhibit III-4 shows the market overview for Electronic Information Services (i.e., the delivery of information).

IV

ELECTRONIC INFORMATION MARKET: OVERVIEW

A

Market Sizing and Competitors

Exhibit IV-1 breaks out the market by vertical industry.

The characteristics of different sizes of vendors are shown in Exhibit IV-2.

- The largest vendors are shown in Exhibit IV-3. This list has been relatively stable for several years. These vendors have been trying to adjust to the new decentralized environment with mixed success.
- The market focus of the leading vendors is shown in Exhibit IV-4.

B

Types of Data/Information

It is very useful to segment the electronic information market by the type of information supplied. Generally, there are greater rewards for supplying more complex information. Data can be classified as

- Simple or compound
- Generic or proprietary

Exhibit IV-5 provides an overview of the differences and Exhibit IV-6 provides contrasting examples in one area, demographics.

Exhibits IV-7 through IV-10 provide examples of each combination. In the real world examples do not fall neatly into these categories; however, they are quite useful for analysis and planning.

There is increasing movement into the higher value categories.

- Exhibit IV-11 shows how traditional packaged goods market analysis has not been able to unite data at the individual household level.

- Exhibits IV-12 and IV-13 show approaches for uniting data on individual households as close to the buying point as possible.

Electronic distribution of data overlaps other delivery mechanisms (Exhibit IV-14), especially providing data as part of a processing service. There has been remarkably little movement so far to package information as part of separately billed consulting services.

V
VERTICALLY-FOCUSSED INFORMATION

The majority of information niches are vertically oriented. This section provides information on two niches:

- Grocery/food
- Health care

In addition, this section will address several specific questions raised by American Express on the financial services sector.

In this section the term "electronic commerce" is often used. This concept -- which unites information, processing and, sometimes, outsourcing -- could be a useful objective, or at least planning alternative, for some of American Express's future initiatives.

A
Grocery/Food

American Express will not necessarily offer information products for this sector. However, this sector is representative of packaged goods, which is the largest and most sophisticated of the information-consuming sectors. Lessons learned here may be applicable in sectors that are less developed from an information standpoint.

Exhibits V-1 and V-2 show the flow of trade (hence, information) between different sub-sectors.

- Exhibit V-3 shows the types of potential electronic commerce services used by the different sub-sectors.
- The major vendors providing electronic commerce services are listed in Exhibit V-4.

- The major vendors for one service group, product movement data, is shown in Exhibit V-5.
- The size of the market, broken down into major service groups is shown in Exhibit V-6. With small exceptions these represent processing or information-provision services.

B

Health Care

Exhibit V-7 shows the trading relationships between different parts of the health care sector. The input-output matrix in Exhibit V-8 shows the major areas of interaction. (Note: The entities identified by the horizontal "Requestor" numbers are the same as those shown vertically.)

Electronic commerce in this market is expected to grow at a 28% annual rate (Exhibit V-9), with claims processing and electronic information accounting for a majority of expenditures. Leading information suppliers are shown in Exhibit V-10.

C

Financial Services

This section addresses the three card/bank processing questions on the "Trends" list of questions.

1. Third Party, High Volume Billing Systems

There has been limited success for high volume (i.e., transaction processing) billing systems offered on a software-only basis by third parties.

- Card processors (whether operating on a service basis or for internal use) have developed their own proprietary systems. In most cases these would be very hard to commercialize because of poor code, non-existent documentation or for other reasons. Where systems are good these are seen as a competitive advantage. Given the fact that the number of entities processing cards is declining overall, there is a question as to whether there would be a market in any event (at least for the traditional platforms).

- There have been large scale banking software systems offered in the 1980s which included billing modules. These products developed by Uccel (Computer Associates), Cullinet (Computer Associates) and Hogan, among others have not been significant commercial successes. EDS's project in conjunction with Banc One and Norwest may develop a more viable product, although it is not clear if its architecture will be attractive.

- The large scale system that Mellon Bank uses for processing contracts has been sold to other parties, but there have been questions about the financial success of this effort.

- INPUT has been tracking banking software for some time (see Exhibit V-11) and has not seen much activity here.

- There are commercial products available for utility and other billing, but these are designed for much more controlled environments than in card processing and banking and are not really comparable.

2. Outsourcing of Credit Card and Other Billing

INPUT is still in the process of developing precise numbers in this area. However, several trends are apparent:

- The universe of banks is shrinking overall due to mergers.

- Few, probably no, banks are taking back from current processors credit card business.

- Banks have been selling off entire credit card portfolios and have been contracting for processing to third parties.

It is not clear if significant decreases in hardware costs would tempt banks back into operating their own processing.

3. Breaking Down Barriers to Entry

Briefly, POS data entry is sweeping all other entry modes aside. INPUT sees POS data entry as having a neutral effect on the competitive environment:

- POS entry will place somewhat greater emphasis on technology, helping established players, who are generally already investing in technology..
- On the other hand, POS networks (for both approval and data entry) represent duplication and inefficiency. There is a functional need for only a small number of competing networks (as has happened in ATM networks). This trend could ultimately place pressure on the card processors if they have to use competitors' networks.
- Some entrepreneurs are considering further innovations in "smart card" and related technology that might have an impact on POS and network utilization.

INVOICE

INPUT FEDERAL ID# 94-2385674

INPUT
1280 Villa Street Mountain View, CA 94041 (415) 961-3300
Telex 171407 Fax (415) 961-3966

ATTENTION: Accounts Payable

TO

AMERICAN EXPRESS
Ezra Wohlgemuth
American Express Tower
World Financial
New York, NY 10285

(212) 680-3318

DATE 11/03/1992

INVOICE # 112043

PROJ. CODE YNGEN

SALES ORDER # 112118

PURCHASE ORDER #

ORDER DESCRIPTION	AMOUNT
1 YNAMX-YC Custom - American Express	5,000.00
1 AAOHD-SH Shipping Charge	40.40
Total Order Amount	$ 5,040.40

PROFESSIONAL FEE FOR CUSTOM RESEARCH LEVERAGING FDC DATA

AMOUNT INVOICED	$ 5,040.40

Thank You!

INV 6/88

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Thank You!

INV 6/88

CRITICAL CLIENT/SERVER CHOICES

- **Platform**
- **Database interface (server)**
- **GUI (client)**
- **Development tools**

These were previously
given to you

I have added
YNAMX

Will reprint all on
INPUT page

CLIENT/SERVER PLATFORMS

- Contenders (alphabetic order)
    - Apple
    - NT
    - OS/2
    - UNIX
    - Windows
- Converging functionality
- Consolidation slowed by distributed buying points?

DATABASE INTERFACE (SERVER)

- Many choices, e.g.,
  - DB2
  - HP
  - Informix
  - Ingres
  - Oracle
  - Rdb
  - SQL Server
  - Sybase
- Mini retrofits
- No obvious dominance

GUIs (CLIENT)

- GUI almost half of coding for C/S application: attraction of common GUI
- Common user access doesn't mean standard GUI
- Proprietary platform-supplier: little incentive for common GUIs
- End users may not care

C/S TOOLS: SUPERSET INTERFACE??

Examples

- Easel
- Ellipse
- Gupta SQL
- Mozart
- Powerbuilder
- Viewpoint

C/S TOOL ISSUES

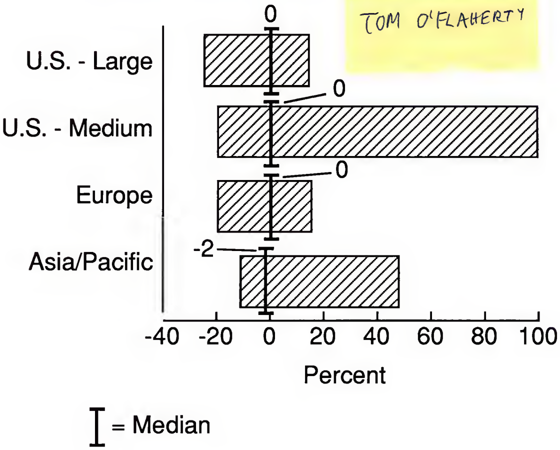
- Many-to-many interfaces
- Small vendors
- Incomplete solutions (design only)
- Proprietary shortcuts

CLIENT/SERVER DEFINITION

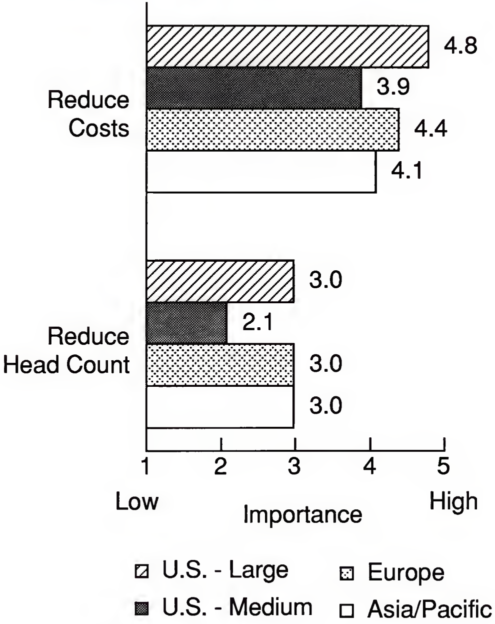
- LAN-based, including
  - Interconnected LANs
  - Connections to minis, mainframes
- Shared data
- Probably, microprocessor-based (including "scalable" architectures)
- Possibly, segmented processing

Telecommunications Budget Changes, 1991-1994

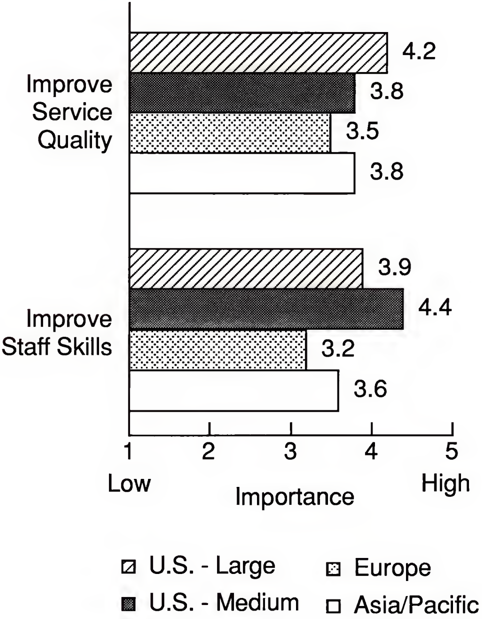
TOM O'FLAHERTY



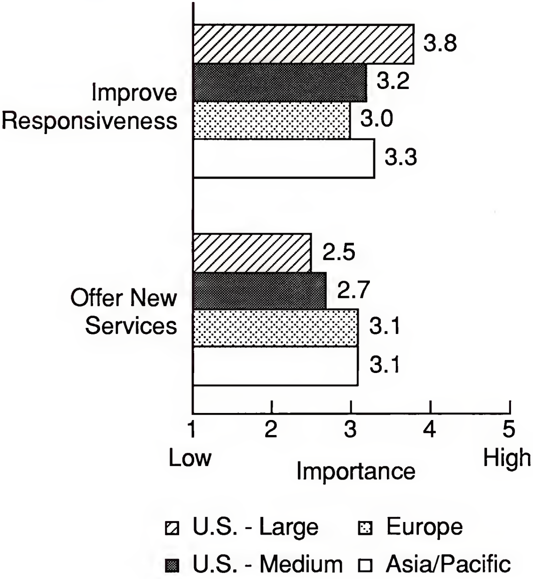
Network Manager Priorities



Network Manager Priorities



Network Manager Priorities



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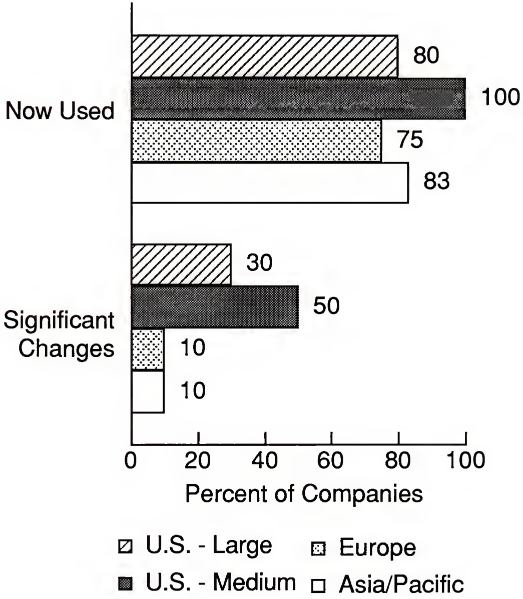
Intra-Company E-Mail



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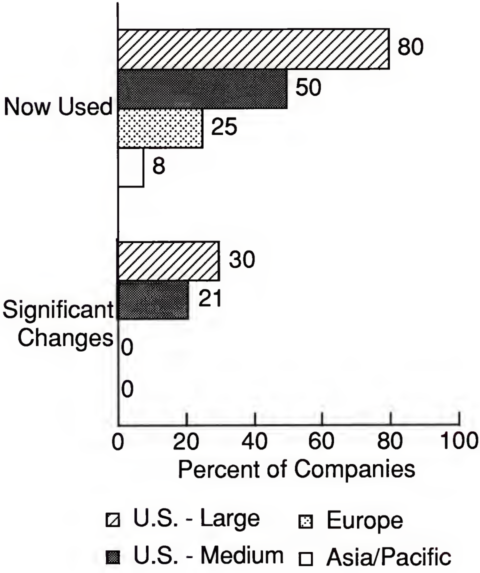
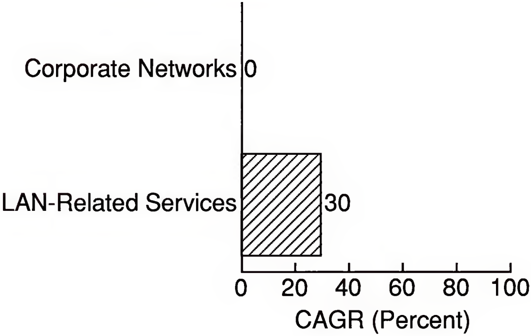
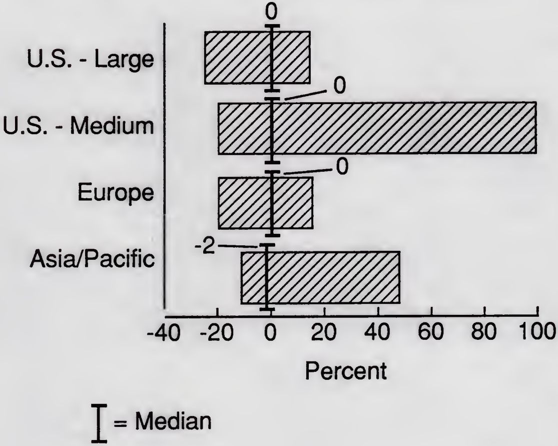


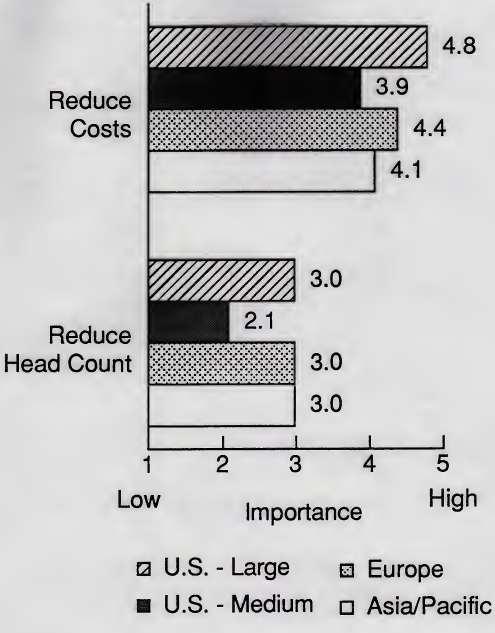
U.S. Communications Budget Growth, 1991-1994



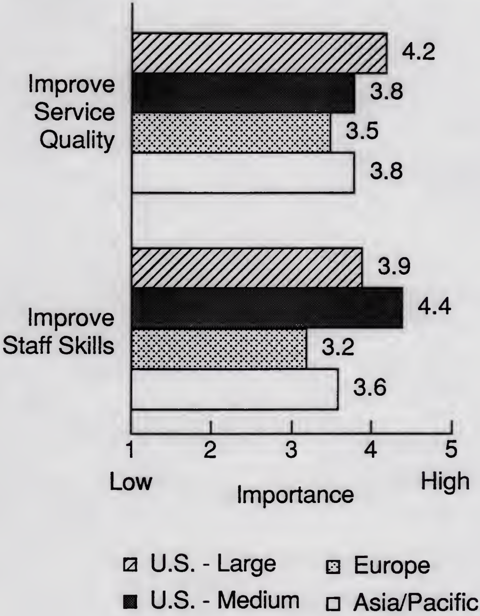
Telecommunications Budget Changes, 1991-1994



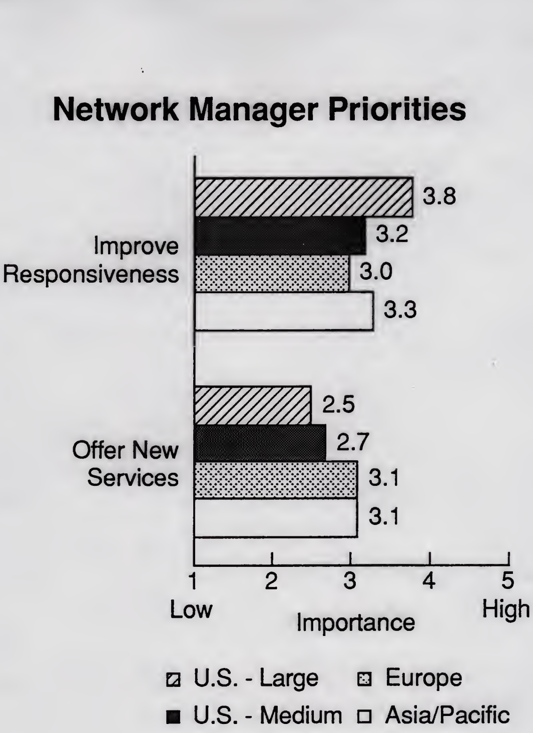
Network Manager Priorities



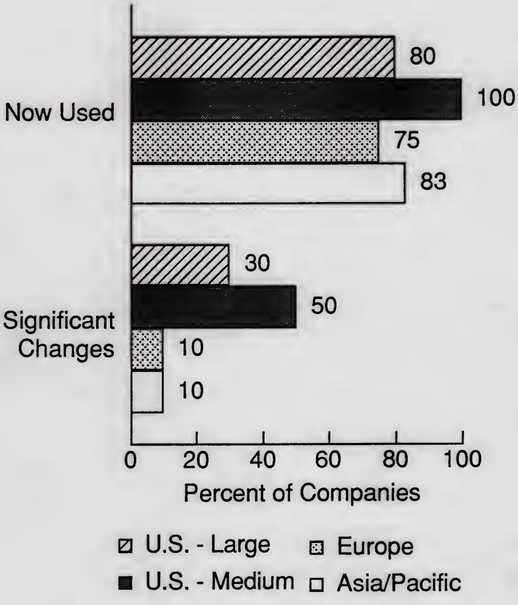
Network Manager Priorities



Network Manager Priorities



Intra-Company E-Mail



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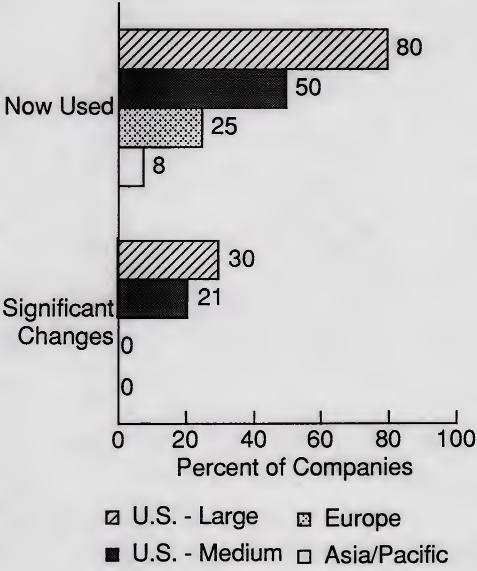
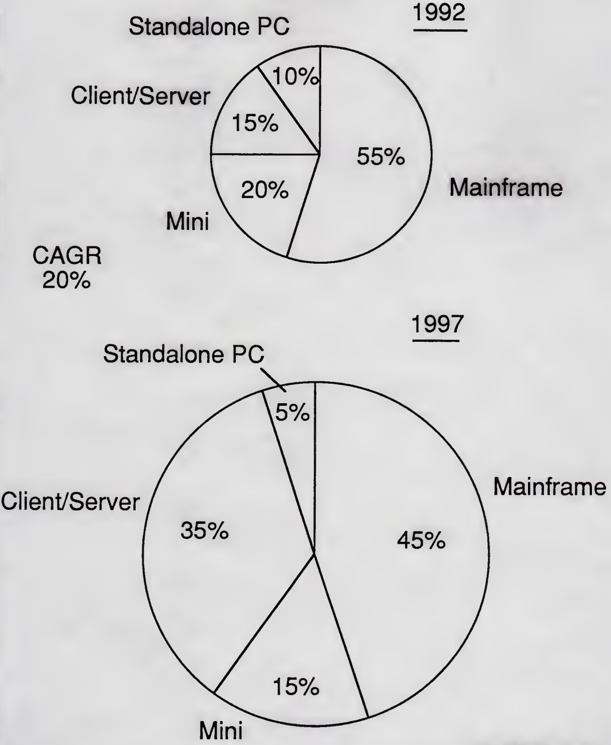
Inter-Company E-Mail



INPUT

Mission-Critical Applications Growth and Location

Preliminary



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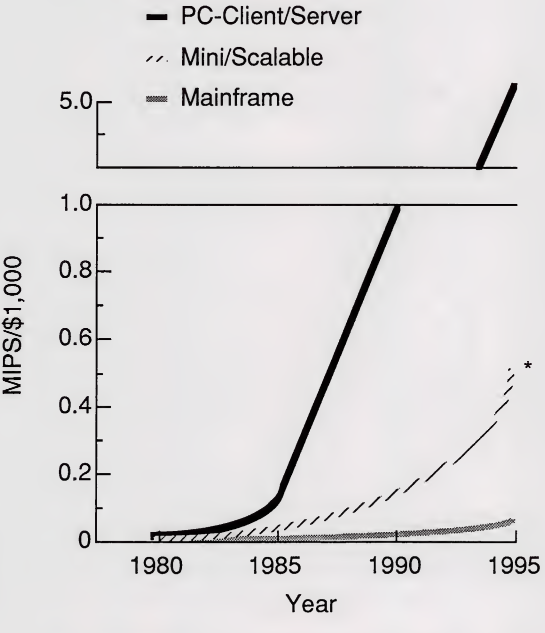
MIPS/$1,000

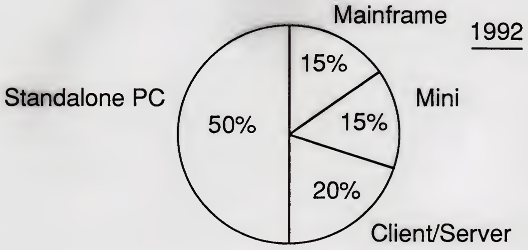


* Includes scalable processors, e.g., NCR 3000 series.

Sources: Dataquest, Yankee, INPUT

Personal Productivity Applications Growth and Location (Spreadsheet, WP, E-Mail)

Preliminary



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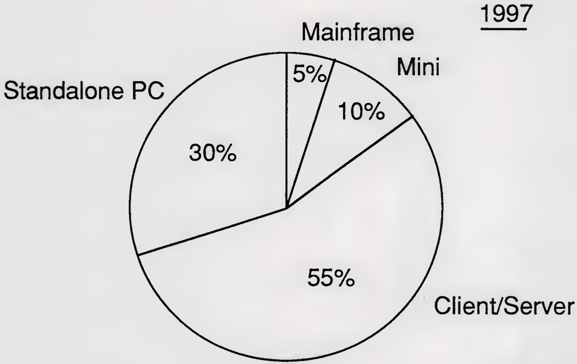

U.S. Communications Budget Growth, 1991-1994